Products, tools and services from the Physical Oceanography DAAC

Ed Armstrong, Pat Liggett, Kelley Case

Jet Propulsion Laboratory

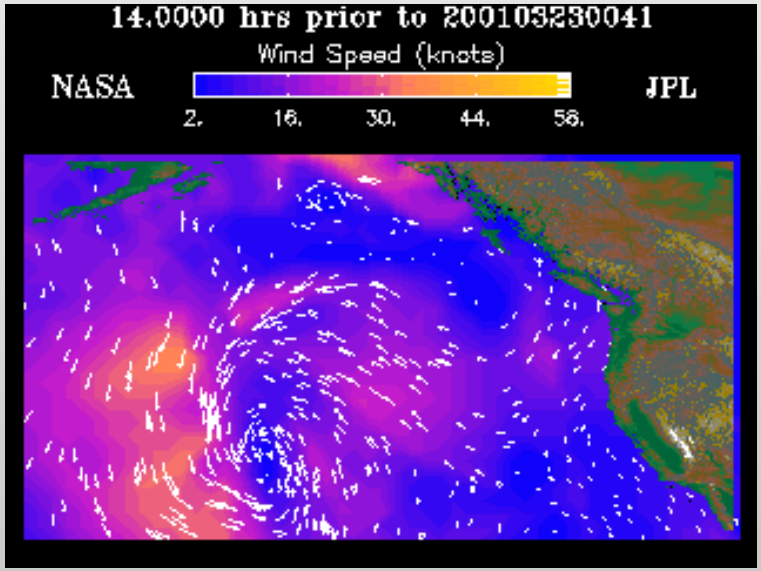
California Institute of Technology

PO.DAAC Data Holdings

- Sea Surface Temperature
- Sea Surface Height / Altimetry
- Ocean Winds
- Multi Parameter Products
- Educational/Informational Products

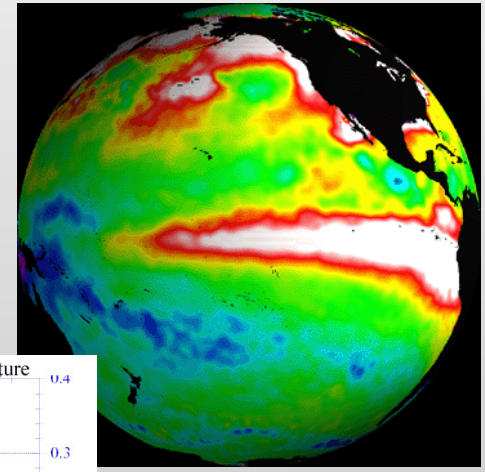
JPL Physical Oceanography DAAC

- EL NINO PREDICTION
- SEA LEVEL RISE
- WEATHER FORECAST
- GLOBAL CLIMATE CHANGE RESEARCH

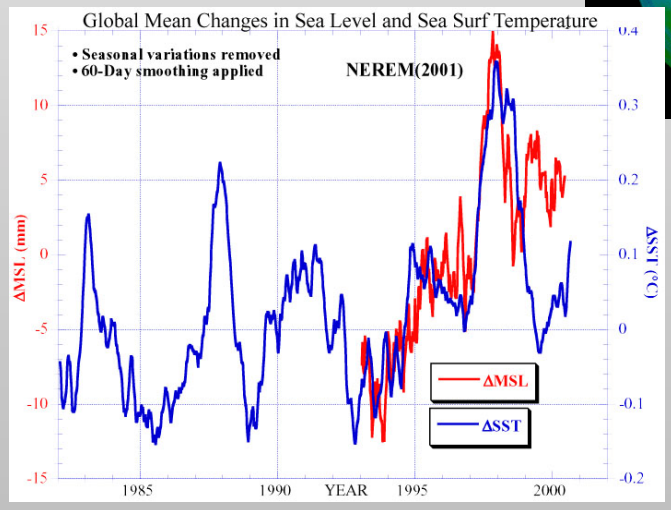


NEAR SURFACE WIND VECTOR

SEA SURFACE HEIGHT



SEA SURFACE TEMPERATURE



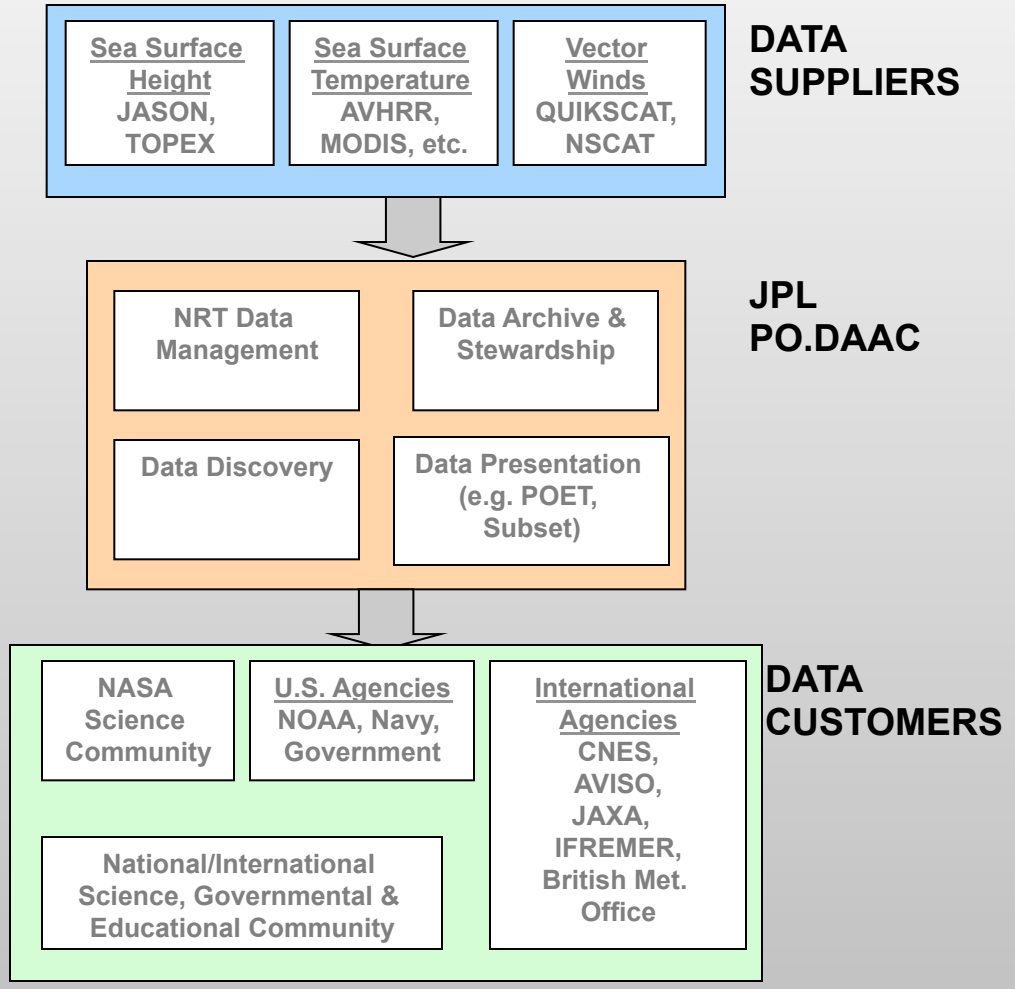
Physical Oceanography Distributed Active Archive Center

(PO.DAAC)

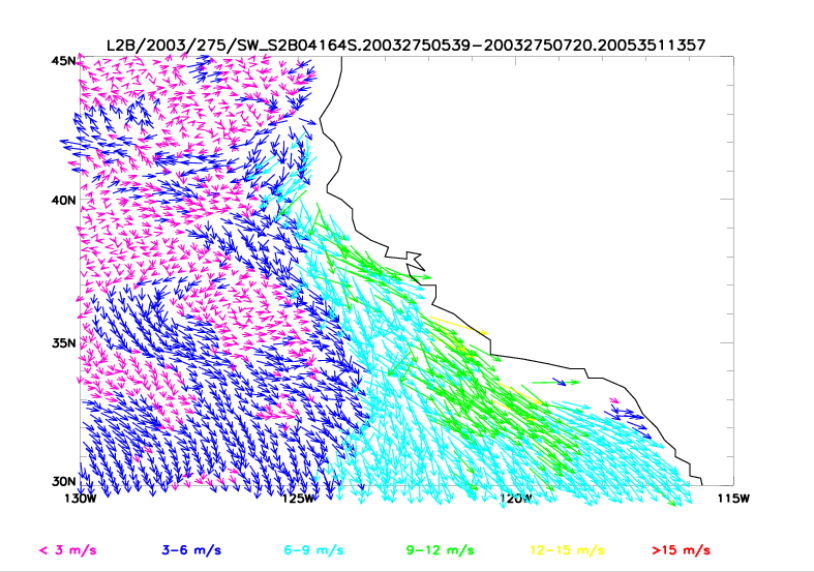
Manage and deliver physical oceanographic data

- Main clearinghouse for satellite data sets that describe the physical state of the ocean, including sea surface temperature, height, and vector winds.
- Archive in support of JPL flight projects.
- Manage near-real-time data streams, including quality control & status checks.
- Tools for near-real-time visualization of all products.
- User Support Services provide technical and scientific expertise for all PO.DAAC data.
- Subsetting of global satellite products.
- Output data in different formats for maximum user flexibility.
- Visualization and animations of data sets.

Serving NASA Missions and the Nation with Global Physical Oceanic Data and Information

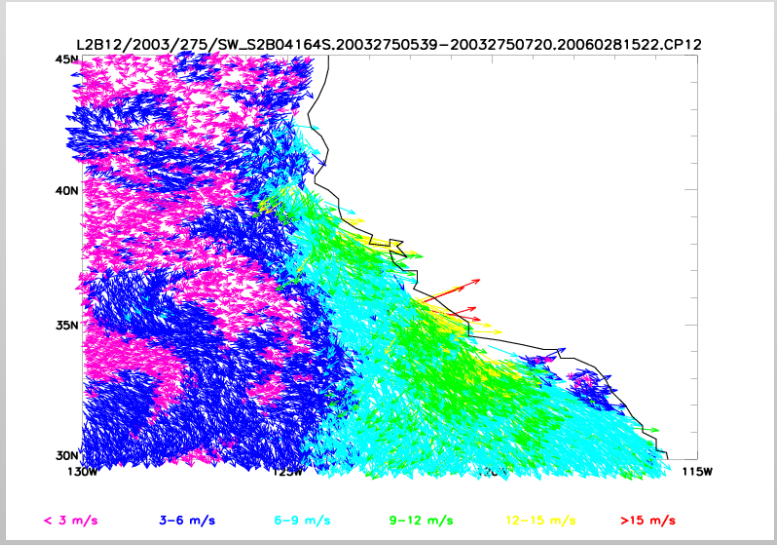


QuikSCAT winds

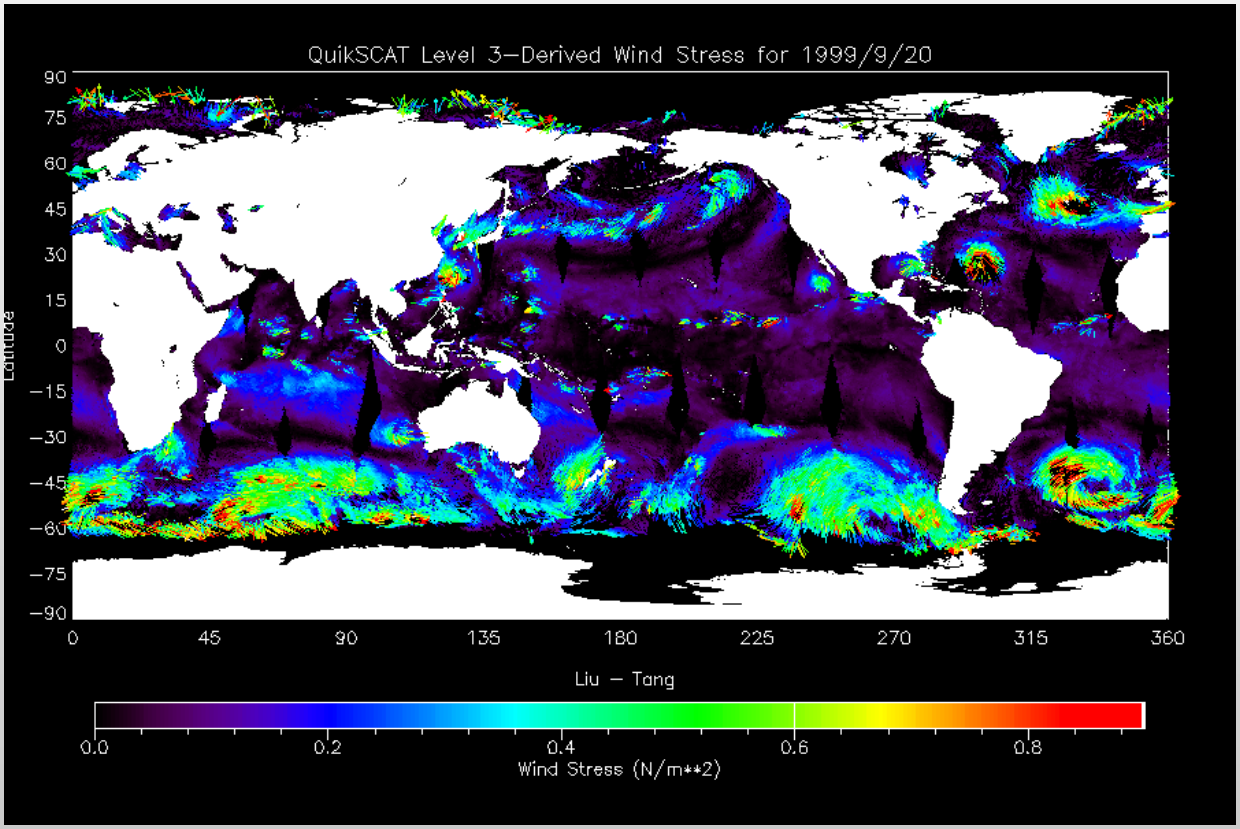


25 km

12.5 km

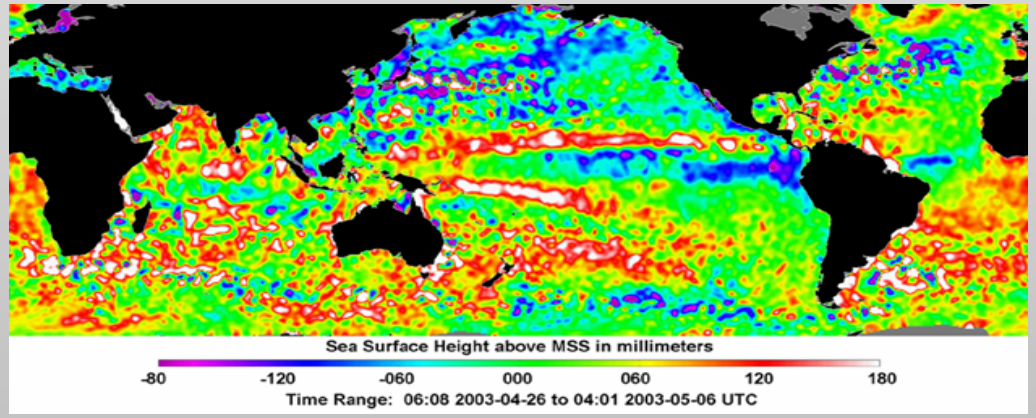


Wind Stress (and curl)



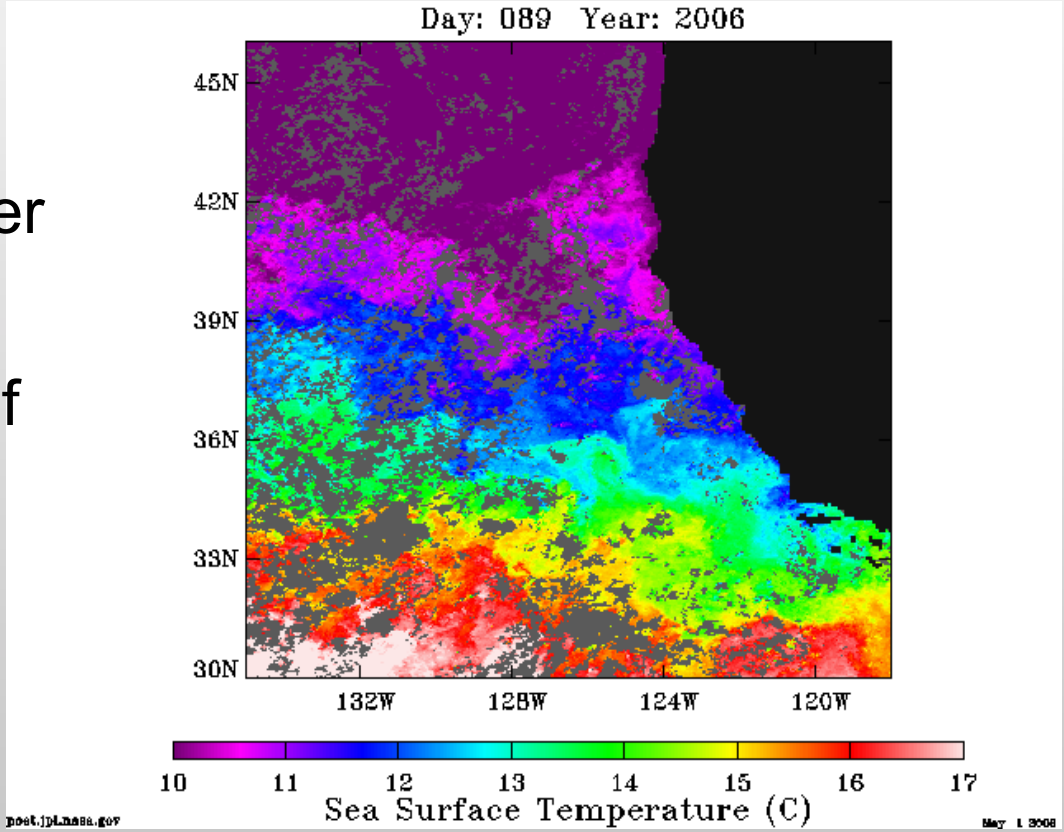
Altimetery

- **Jason Geophysical Data Record (GDR)**
  - **Full accuracy altimeter data with the high precision orbit**
  - **Provided in approximately 30 days of data measurement**
  - **Validated data product**
  - **3.3 cm sea level accuracy**
  - **Near realtime SSH anomaly available within hours at about 4.5 cm accuracy**



Sea Surface Temperature

- Global Terra & Aqua MODIS 4 km
- Global 4 km Pathfinder SST (1985-2005)
- Longest time series of AVHRR from 1981 (MCSST)
- GHRSST



Aqua SST, 1-8 Apr 2006

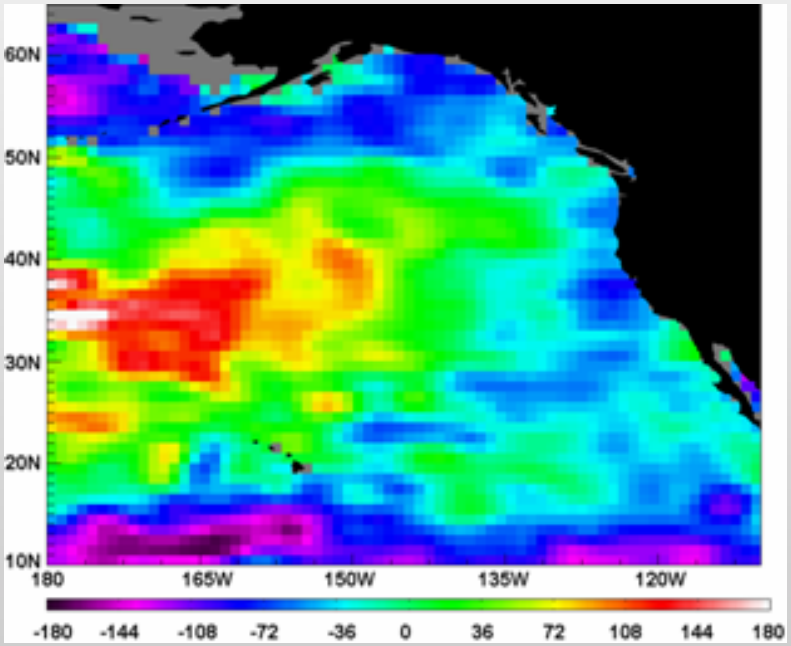
PO.DAAC Ocean ESIP Tool (POET)
http://poet.jpl.nasa.gov

- **POET is an interactive, on-line system**
  - **Subsetting capabilities**
  - **Data visualization**

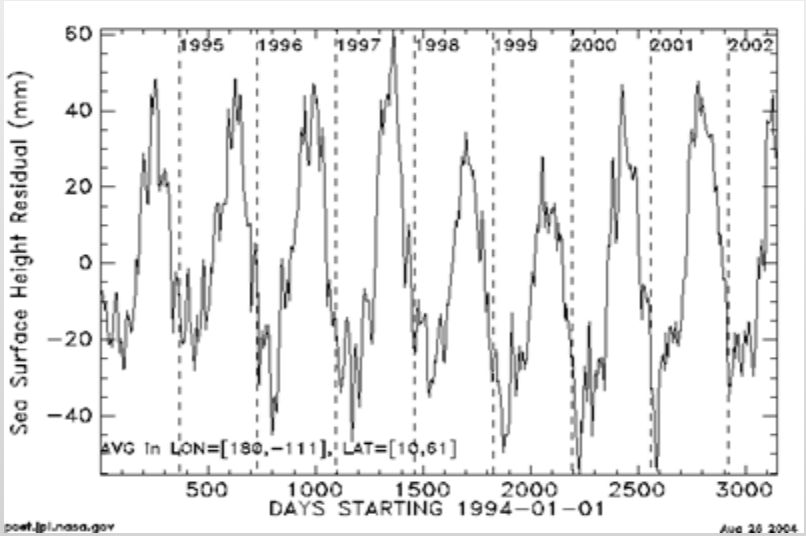
- **Output options include:**
  - **Latitude-longitude map**
  - **Animation**
  - **Time-series graph**
  - **Space-time profile**

- **Data format options include:**
  - **GIS formats (GeoTIFF, ArcGrid)**
  - **Image formats (GIF, PNG, JPEG)**
  - **Science data formats (HDF, netCDF)**
  - **Raw data (binary, ASCII)**

PO.DAAC Ocean ESIP Tool (POET)



Regional subset of T/P Sea Surface Height Anomaly data for the period November 19-23, 2000, generated by POET

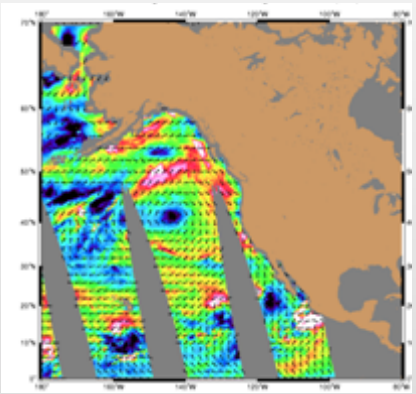


Ten-year time series of regional subset (left), starting January 1, 1994, generated by POET

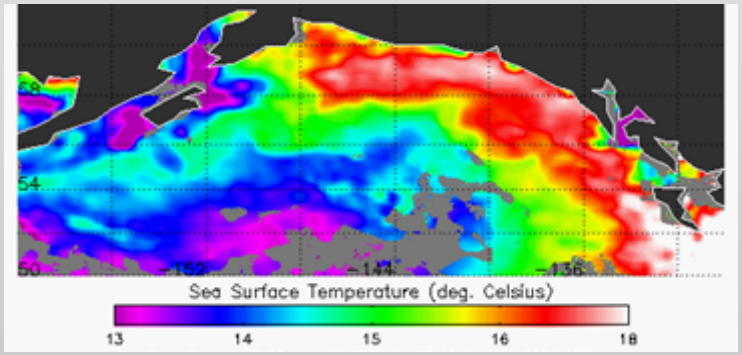
Near-Real-Time Image Distribution Server (NEREIDS)

http://nereids.jpl.nasa.gov

- **near-real-time browse images include:**
  - **sea surface height**
  - **sea surface temperature**
  - **ocean vector winds**
  - **land and sea ice**

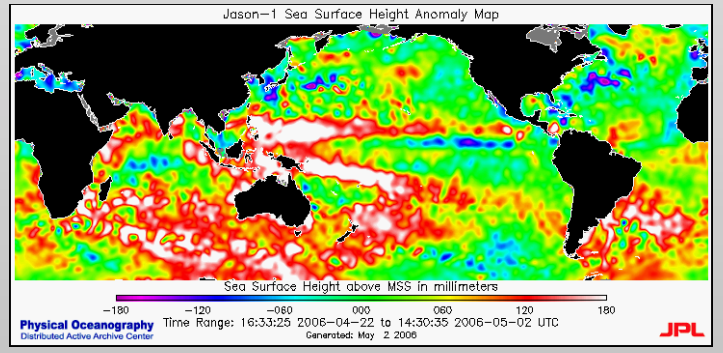


Wind Speed and Direction from QuikSCAT satellite Aug 25 13:01 2004 to Aug 25 18: 12 2004 (GMT)



NAVOCEANO MCSST NOAA-17 Sea Surface Temperature on Aug 18-22, 2004

SSH from Jason-1 May 2, 2006



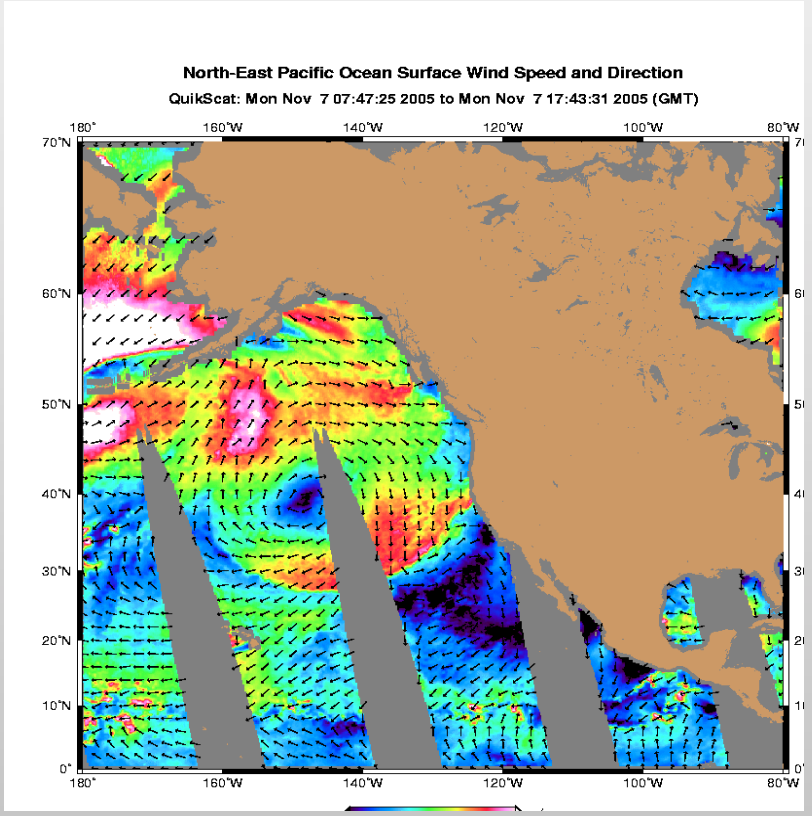
Data distribution and discovery

- FTP (w/ bandwidth optimization)
- POET (World Map Server)
- NEREIDS (Near realtime imagery)
- OPenDAP
- GHRSST metadata catalog
- New technology:
  - “data casting” (i.e, RSS for data products)
  - L2 subsetting

User scenarios

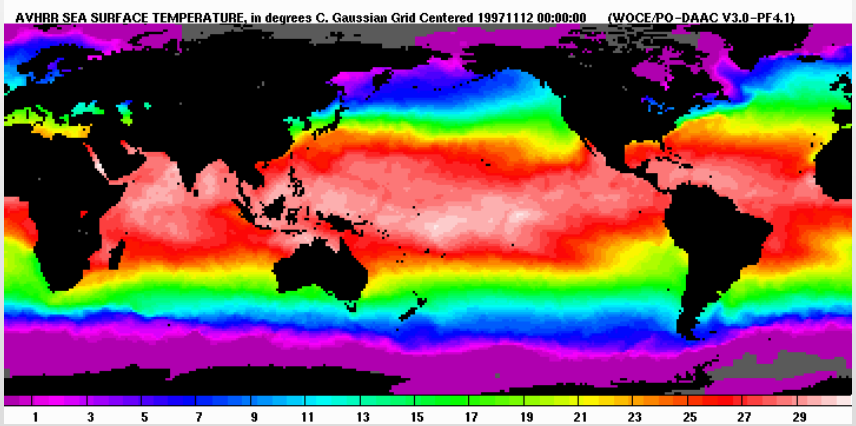
Operational (Near-Real-Time) User

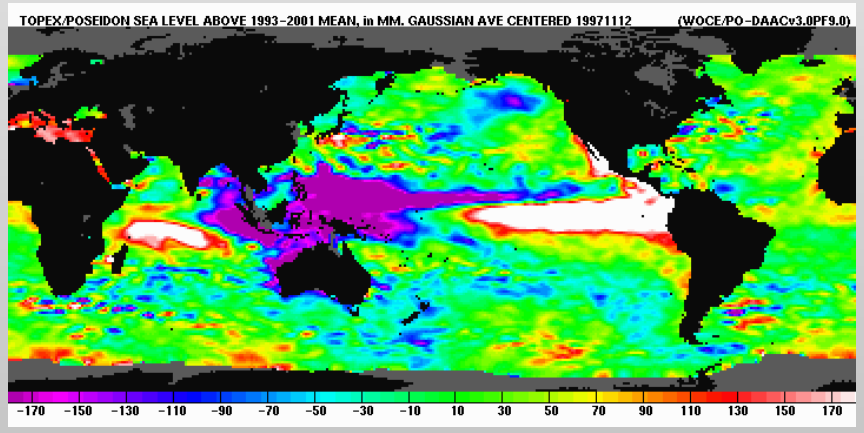
- Subscription service to data products by user-defined spatial domain
- Receive automated notification as data become available or receive a direct push
- Example: user wants daily wind vectors for North East Pacific Ocean



Interdisciplinary Research User

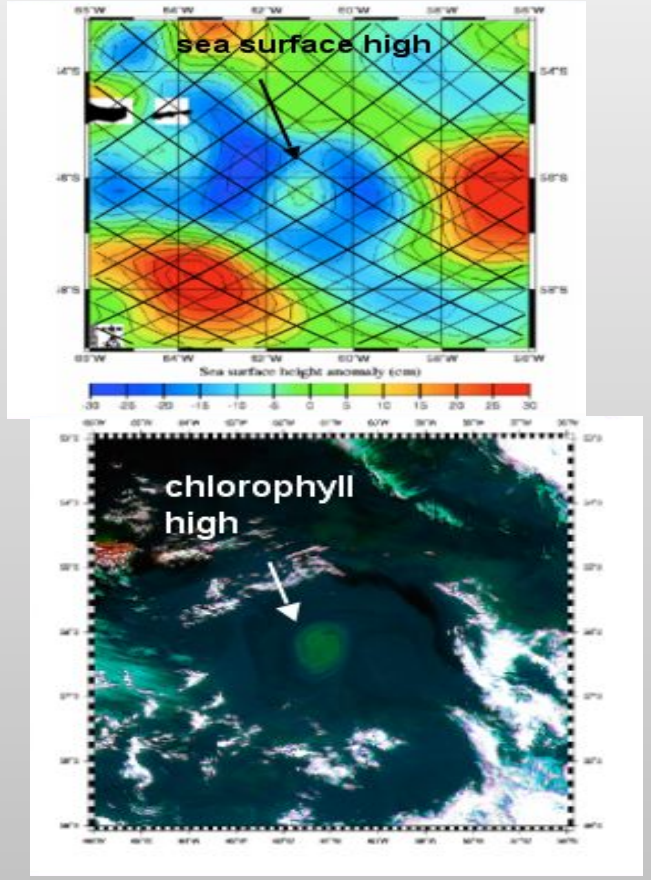
- User wants multiple measurements co-registered to the same time/space grid
- Example: AVHRR SST and Topex/ Poseidon sea level data at 1x1 degree grid





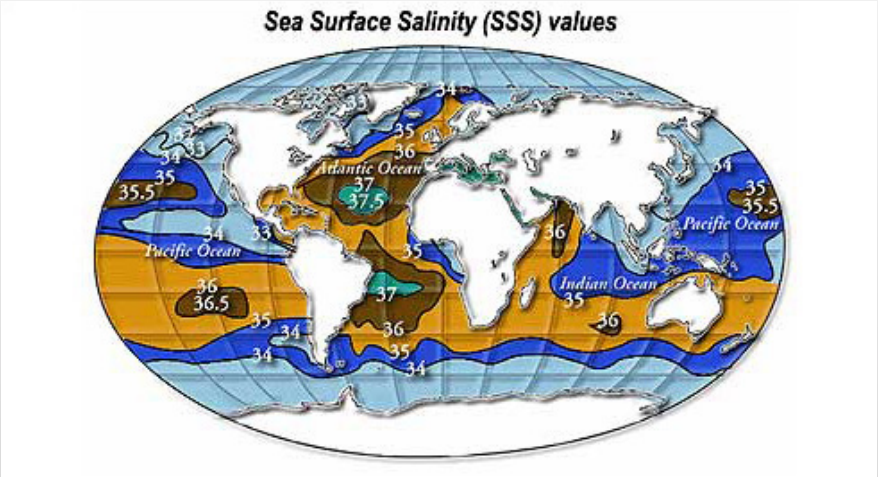
Interdisciplinary Research User

- User wants to overlay different measurements in selected region (contours or vectors over color image)
- Example: combination of Topex/ Poseidon/Jason sea surface height from and SeaWiFS ocean color imagery shows small eddy of Drake Passage
- Note: data products may reside remotely



Research User

- User obtains a monthly salinity map from PO.DAAC and wants the corresponding input data
- Level-2 Aquarius data files used for input are located at GSFC
- User receives list of (linked) granules



ftp://obpg.gsfc.nasa.gov/aquarius/c001_p125.dat
ftp://obpg.gsfc.nasa.gov/aquarius/c001_p126.dat
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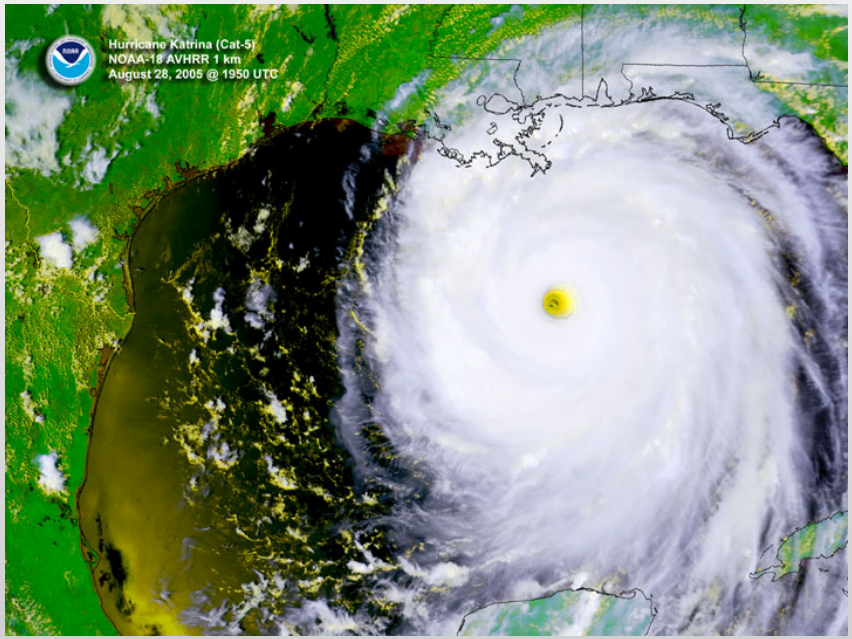
ftp://obpg.gsfc.nasa.gov/aquarius/c001_p131.dat
ftp://obpg.gsfc.nasa.gov/aquarius/c001_p132.dat

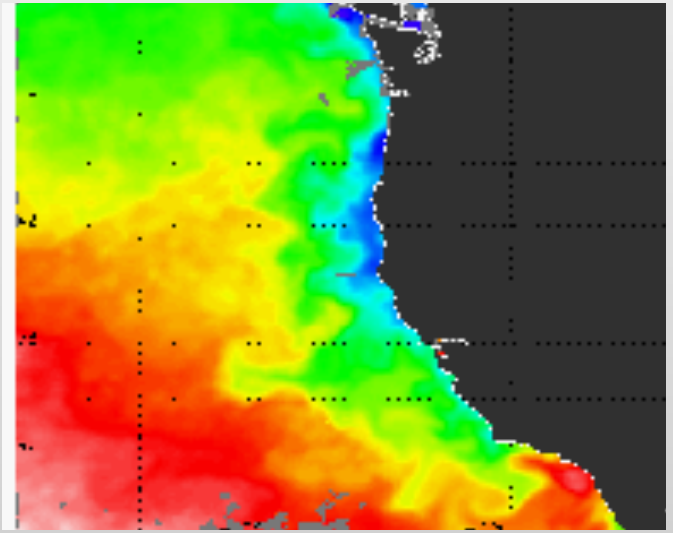
Event Tagging

- User wants to search all data granules for specific events (e.g., hurricane, tsunami, El Niño, algal blooms, etc.)
- Metadata and granule search



Decision Support Application User

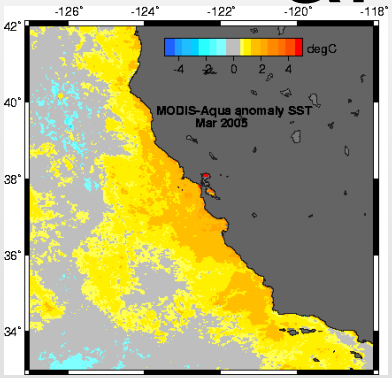
- User wants high-resolution SST coastal data, blended from multiple instruments
- Example: combine SST measurements from active/passive sensors, and in-situ data
- Note: some input data may reside remotely

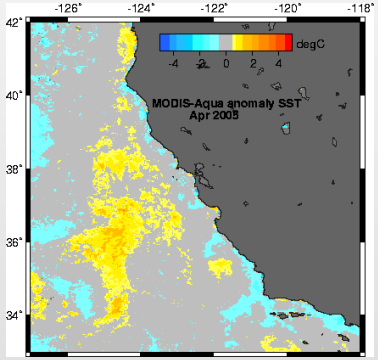


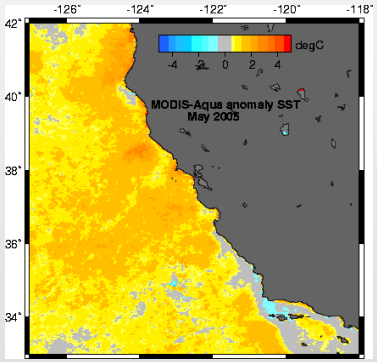
Climatologies

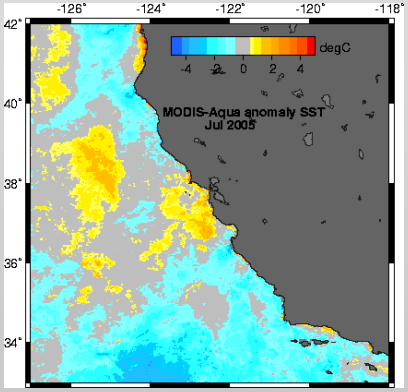
- Current
  - 4 km NODC AVHRR Pathfinder SST
  - Reynolds SST climatology
- Potential candidates:
  - Winds from QuikSCAT
  - Waves/Winds from Topex/Poseidon
  - SST from MODIS Terra

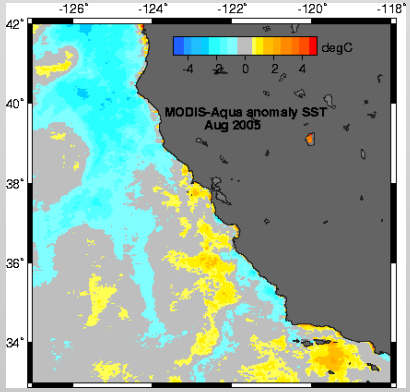
High resolution SST anomalies in 2005

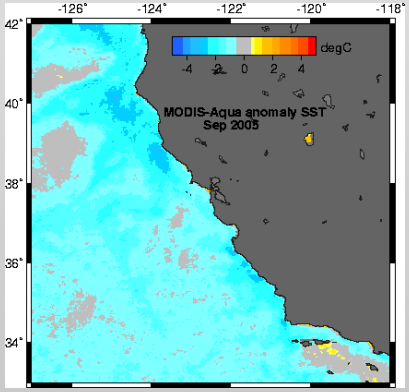




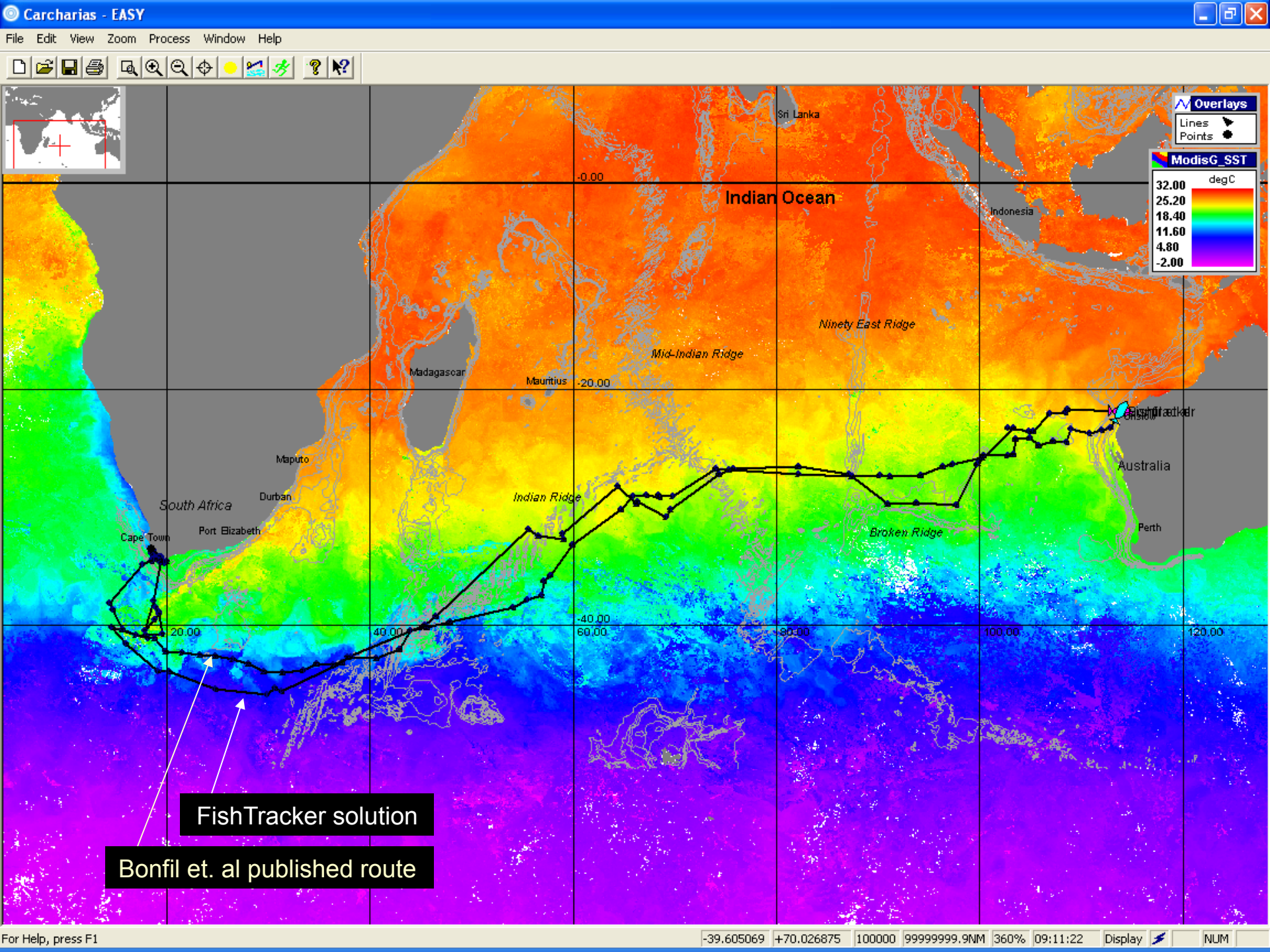








SST applications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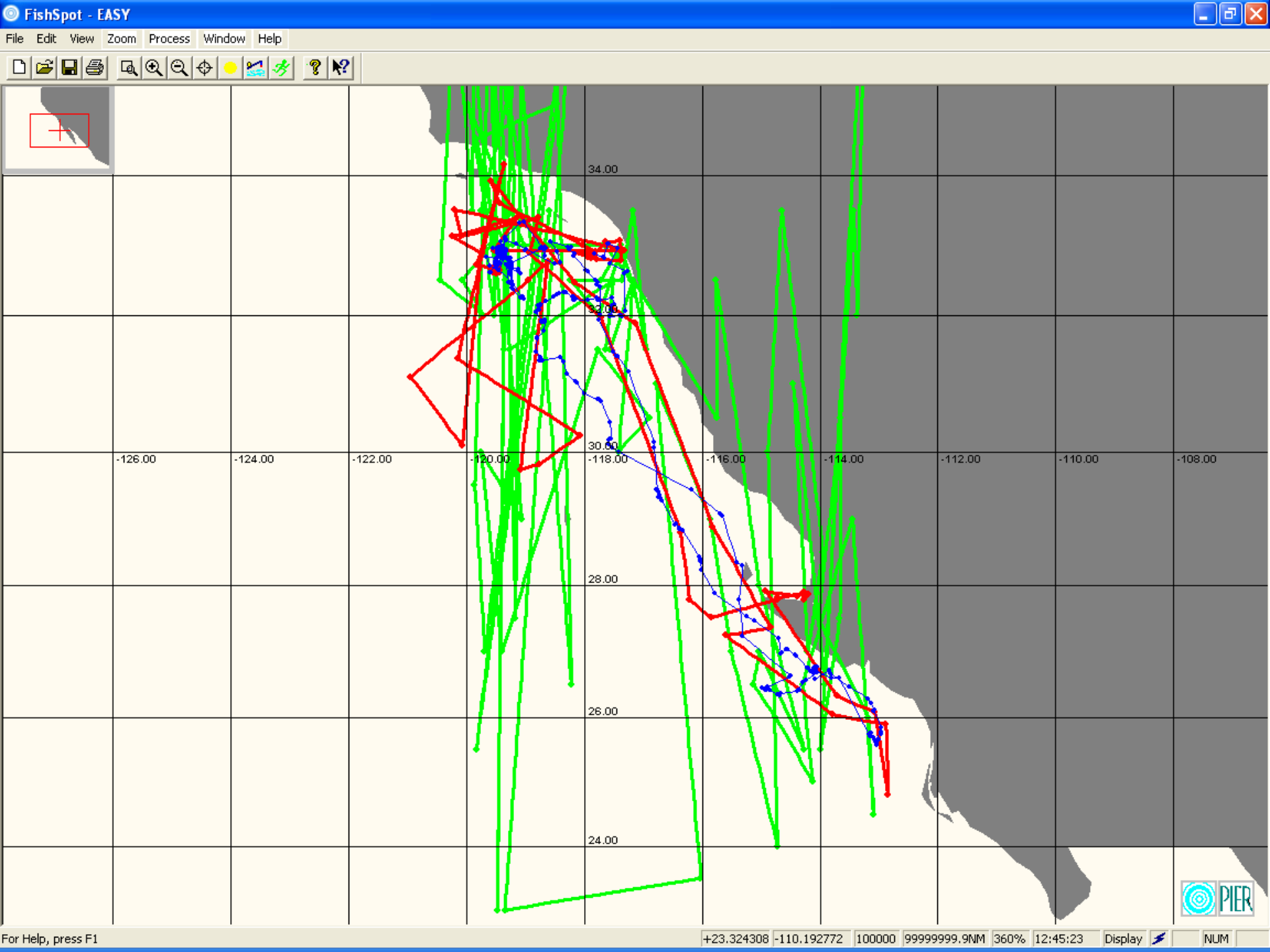
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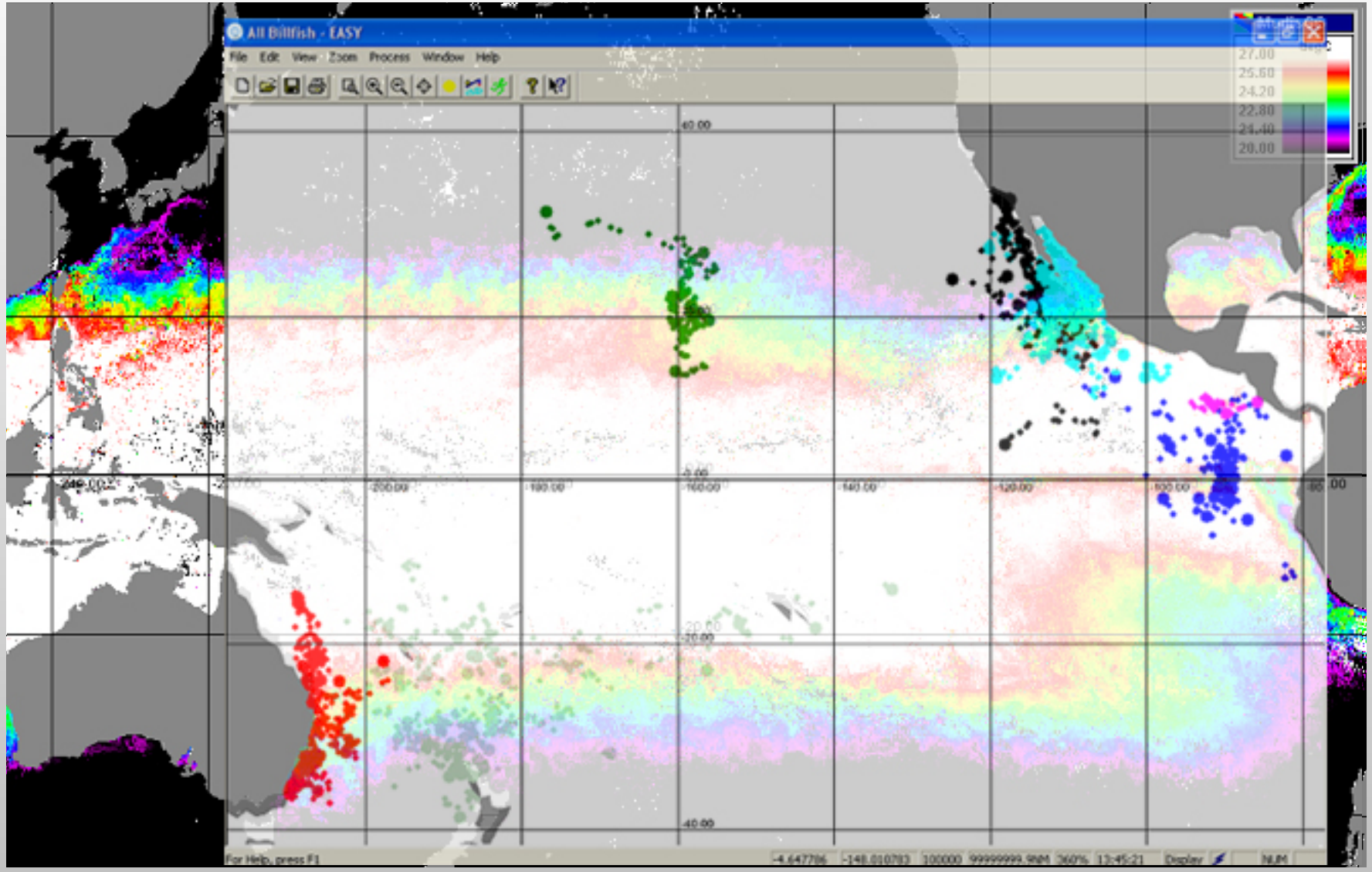
Distribution dependence of striped marlins on temperature



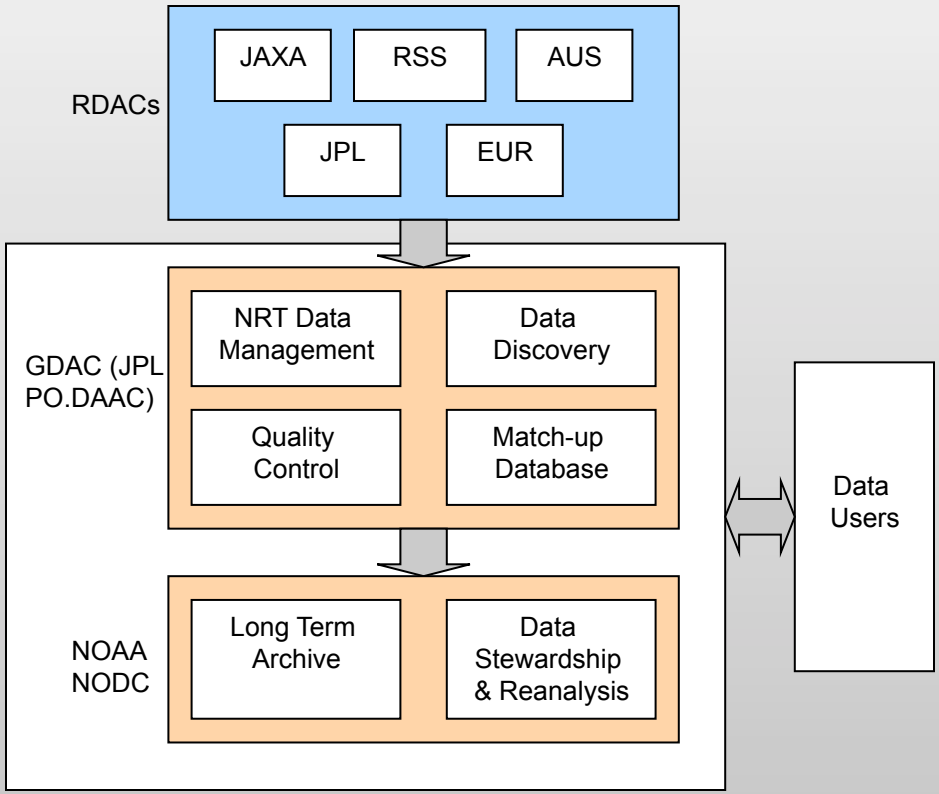
Data from Pfleger Institute of Environmental Research (PIER) and Offield Center for Billfish Studies

GODAE High Resolution Sea Surface Temperature Pilot Project (GHRSST-PP)

http://www.ghrsst-pp.org

- Provide the framework for developing the next generation of operational SST products.
- Produce SST products for assimilation into real-time ocean and climate models.
- An international collaboration between the major centers that produce SST products.
- Develop and implement standards (e.g., data & metadata formats, interoperability).
- Develop data integration methods to generate improved multi-sensor SST products.
- Provide a forum for the SST community to resolve outstanding issues: cloud clearing algorithms, diurnal warming, data merging & access.

A model for collaboration between NASA and NOAA



Present and future GHRSST products of interest

- Global MODIS L2P 1km
  - Collaboration between JPL, OBPG, and RSMAS
  - Include SST and SST4
  - Daytime includes chlorophyll and K490
  - gridded L3 4 km product
- Global AATSR L2P
- Global AMSRE L2P
- Regional GOES L2P
- Regional AVHRR L2P
- Global and regional merged L4 products